Ecosystem Based Management and Climate Change
FISH 562/563 Spring 2020

Instructor:
Ray Hilborn rayh@uw.edu
Office: 352b Fishery Sciences Tel. 543-3587
Office Hours: .

Kerim Aydin kerim.aydin@noaa.gov

FISH 562 Lecture Session M 12:30-2:20
FISH 563 Lab Session Tu 3:00-4:50

1. Introduction

Perhaps the major challenge to sustainable fisheries is climate change. We know marine ecosystems will change and it is increasingly recognized that single species management is insufficient to achieve societal goals for marine ecosystems, and that numerous aspects of ecosystems must be considered in decision making. The general field has become known as Ecosystem Based Management, or the Ecosystem Approach to Fisheries, or Ecosystem Based Fisheries Management and there is a large and expanding literature on the theory and practice associated with these topics.

In this course we will read much of the primary literature on ecosystem based management, and explore the major aspects of ecosystem based management including

- the impact of climate change on marine ecosystems,
- the interaction between people (communities, societies and individuals) and marine fisheries
- interactions between species and their environment,
- methods of by-catch reduction and avoidance,
- the behavior of fishing fleets and how they respond to regulations and incentives,
- marine spatial planning and marine protected areas as a tool in EBM and
- the dynamic interaction between marine ecosystems, fishing fleets and management agencies.

The course will be offered as a 2 graded credit lecture/discussion course (FISH 562) with an additional option 2 graded credit laboratory (FISH 563) in which quantitative tools in ecosystem based management will be explored.

FISH 563 (the computer laboratory) will be primarily directed by Dr. Kerim Aydin from the Alaska Fisheries Science Center. The laboratory sections will use state-of-the-art models to

- Become familiar with multispecies and ecosystem modeling techniques for modeling ecosystem trade-offs and impact of climate change on ecosystems.
- Set up and evaluate results of trade-off scenarios.
- Hands-on work with goals and metrics; e.g. determining and evaluating ecosystem reference points.
- Examine methods for coping with uncertainty in ecosystem models (e.g. uncertainty in functional responses, environmental forcing, etc.)

FISH 562 will meet once a week for 2 hours, and the laboratory section 563 will meet for one 2 hour session each week.

2. Course Objectives:
By the end of the course you will

1. Be familiar with the primary literature on EBM and how climate change will affect marine ecosystems
2. Understand the different perspectives on the essential elements of EBM
3. Understand how and where EBM is being applied and where it is not
4. Those taking the laboratory section will have experience in the potential and limitations of the models proposed for use in EBM and know several of these models well.

3. Prerequisites

No prerequisites for students in the lecture section. Students in the laboratory section should be familiar with R programming, and ideally having taken fish 454 and 458.

4. Course Requirements and Grading

In the lecture section each student's primarily responsibility will be participation in the class sessions, discussion. Students will provide oral critiques of literature and participate in structured debates on policy consequences. In the laboratory sections there will be four homework assignments.

5. Methods of Instruction
The class meets for 2-hour periods each week 12:30-2:20 M, and the lab section will meet for 1 2-hour session 3:00-5:00 on Tuesdays.

Each two hour meetings of 562 will revolve around pre-assigned readings, and students will present critical analysis of the papers and there will be structured debates on the policy implications of the readings. The specific topics by week will be

1. How marine ecosystems behave, historical response to climate change.
2. Protection of non-target species and sensitive habitats. Impacts of bottom trawling.
3. The role of forage fish in marine ecosystems and trophic impacts. Fishing down food chains and balanced harvesting.

4. Human communities a part of Ecosystem Based Fisheries Management. How communities can adapt to climate change.
5. Area based management approaches, resilience to climate change, marine protected areas.
6. How fishing fleets respond to regulation and climate change. Impact on fleets and communities of different types of allocation including open access, TAC and ITQ management.
7. Climate change: predictions about changes in productivity, distribution shifts, and EBFM challenges from climate change
8. Management of mixed stock fisheries, especially in the tropics,
9. Ecosystem indicators for EBFM - what has been proposed what has been implemented.

Student responsibility will be readings, presentation of critical reviews, and participation in policy debates. There will be no exams or papers.

6. Course Policies
Disability Statement

It is crucial that all students in this class have access to the full range of learning experiences. At the University of Washington, it is the policy and practice to create inclusive and accessible learning environments consistent with federal and state law.

Full participation in this course requires the following types of engagement:

Requirement(s)

Lecture and discussion sections: the ability to attend weekly lectures-discussion of 2 hours with other students. For students enrolled in FISH 563 the ability to participate in the computer laboraties.

If you anticipate or experience barriers to your learning or full participation in this course based on a physical, learning, or mental health disability, please immediately contact the instructor to discuss possible accommodation(s). A more complete description of the disability policy of the College of the Environment can be found here at https://environment.uw.edu/intranet/academics/teaching/disability-accommodation/. If you have, or think you have, a temporary or permanent disability that impacts your participation in any course, please also contact Disability Resources for Students (DRS) at: 206-543-8924 V / 206-543-8925 TDD / uwdss@uw.edu e-mail / http://www.uw.edu/students/drs.

Roles & Responsibilities

Student: inform the instructor no later than the first week of the quarter of any accommodation(s) you will or may potentially require.

Instructor and TA: maintain strict confidentiality of any student's disability and accommodation(s); help all students meet the learning objectives of this course.

Academic Integrity

At the University level, you must do your own scholarly work. Presenting anyone else's scholarly work (which can include written material, exam answers, graphics or other images, and even ideas) as your own, without proper attribution, is considered academic misconduct.

Plagiarism, cheating, and other misconduct are serious violations of the University of Washington Student Conduct Code (WAC 478-120). We expect that you will know and follow the university's policies on cheating and plagiarism. Any suspected cases of academic misconduct will be handled according to University of Washington regulations.

For more information, see the College of the Environment Academic Misconduct Policy and the University of Washington Community Standards and Student Conduct website.

Plagiarism, cheating, and other misconduct are serious violations of your contract as a student. You are expected to know and follow the University's policies regarding academic integrity.

Accommodation of Religious Observance

Faculty must reasonably accommodate students who, due to the observance of religious holidays, expect to be absent or endure a significant hardship during certain days of the course or program. "Reasonably accommodate" is defined as coordinating with the student on scheduling examinations or other activities necessary for completion of the program and includes rescheduling examinations or activities or offering different times for examinations or activities.

Any student seeking reasonable accommodations must provide written notice to the Office of the University Registrar of the specific dates of absence due to religious accommodation, within the first two weeks of the beginning of the course.